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Comparing migrants to non-migrants: The case of Dutch migration to New Zealand

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Abstract. We analyse post-war Dutch migration to New Zealand. We document that history, reflect on analytical and econometric modelling and then combine a sample of Dutch migrants in New Zealand with a representative sample of Dutch in The Netherlands to estimate wage equations and the determinants of the migration decision. We use the results for ex post evaluation of the migration decision.

JEL classification: F22, J61

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1. Motivation and general framework

Analyses of the economic situation of immigrants commonly focus on their situation in comparison to natives of the destination country. While this is a

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relevant perspective for research on the labour market in the receiving country, it is not the natural focus for the migrants themselves. One may assume that their decision to emigrate was not motivated by a comparison with natives in the destination country, but by comparing their perspectives at home with those for themselves in the destination country. The perceived welfare of natives in the destination country will no doubt affect the expectations of potential migrants. Still, their basic comparison will be between their own homeland position and the position in the destination country. In this paper, we propose to share that perspective. That will make the outlook quite similar to the standard approach in labour market (or geographical) mobility within a country: compare the alternatives of moving and non-moving and assess or explain the decision that has been made by the individual, i.e. to move or not to move.

In this paper we will attempt to assess the consequences of migration decisions by Dutch migrants to New Zealand. Did they fare well? Was it a good decision to emigrate, or had they better stayed at home? Obviously a question that is easier posed than answered, because many factors can be important in the individuals' own assessment, and we may lack the information to take all these factors into account. There are many dimensions to such a comparison. The core of the decision is on the maximum attainable utility in each country, reflecting individuals' optimising behaviour. The optimisation should cover the full scope of individual choices: labour force participation, self-employment versus employment, type of job, labour effort, contribution to and benefits from the public sector (taxes, subsidies, social insurances, etc). The migration decision will relate to the individual's endowments and the opportunity to derive welfare from them in both countries: the social, economic and institutional framework, the uncertainty of realising potential, and tastes, including risk attitudes.

The full conceptual framework is clearly too broad and wide-ranging to apply directly in a single estimation model. The data requirements are too extensive for structural estimates of individual decisions. Obviously, strong simplifications are inevitable. But one should keep this framework in mind when analysing the data and interpret estimation results. We will describe the history of Dutch migration to New Zealand in the next section, and then in Sect. 3, we discuss some more formal modelling, in Sect. 4 we describe the data, in Sect. 5 we present an econometric model and in Sect. 6 we discuss the results. In Sect. 7 we draw the conclusion to our lead question. We will stress that, although correcting for selectivity bias in estimated earnings seems an obvious necessity, it is actually a futile exercise in the present context.

2. Postwar history of Dutch migration to New Zealand[1]

Figure 1 shows the inflow of Dutch migrants into New Zealand in the postwar period (data from Priemus 1997). In the late forties, there was a somewhat complicated start, with a few immigrants from Holland, and a few from Indonesia. In October 1950, a Migration Treaty was signed between the governments of New Zealand and the Netherlands. The governments would share in moving cost for selected migrants aged between 18 and 35, who in

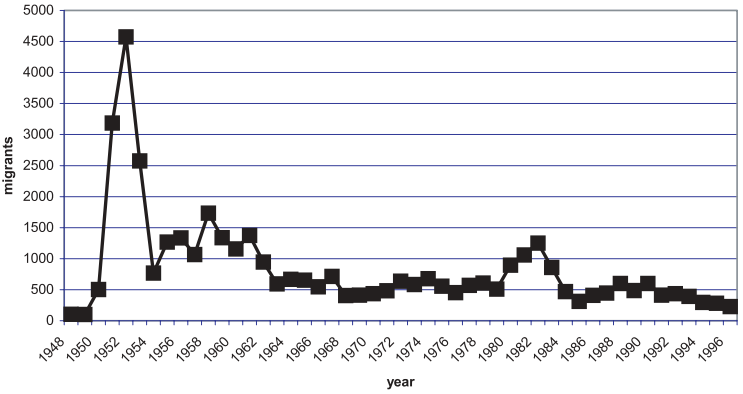

Fig. 1. Dutch immigrants entering New Zealand. (*Source:* Priemus 1997)

return would have to perform a job assigned to them by the New Zealand government for 2 years. New Zealand would set a quota, 1200 men and 800 women for the first year. Immigration rapidly increased, even surpassing the quota, and New Zealand tightened selection in response. Participation in the Assisted Migration Program, as it was called, diminished, from 55% of immigrants in 1953 to 11% in 1958, because immigrants disliked the two year job assignment and because the Dutch government implemented a general subsidy for emigration in 1955, and the New Zealand government participated in this program. In 1956, 90% of the immigrants were subsidised; the percentage would remain that high for a long period.

Between 1955 and 1957, the Nomination System was introduced. Churches, business firms and the Dutch Emigration Service were allowed to have families immigrate, provided they guaranteed work and housing. The New Zealand government set an annual quota of 1000 immigrants without any further restrictions. The quota usually was not exhausted, except in the early 1980's when the recession hit particularly hard in the Netherlands and the unemployment rate soared up.

In 1993, the Dutch government denounced the Migration Treaty, as emigration policy was abolished as a government activity. As a consequence, Dutch applicants for immigration were subject to the general system that selects on the basis of points awarded for age, education and experience. By that time, Dutch immigration had already steadily diminished.

Priemus (1997) notes that entrants were carefully selected, initially by the New Zealand authorities under the Assisted Migration Program and later by the Dutch under the Nomination System (under this system, an unsuccessful immigrant returned to Holland at Dutch expense). It was certainly not only farmers who emigrated to predominantly agricultural New Zealand.[2] While the percentage was indeed 43% in 1950, it was down to 16% in 1951 and to only 7% in 1962. The share of farmers among the Dutch is now comparable to that among the New Zealanders (some 12%). Dutch immigrants are and have been overrepresented in manufacturing and construction and underrepresented in commerce. The share of self-employed is quite high, at 24% of those fully active in 1981, with a comparable 13% for the entire New Zealand active population. Unemployment among the Dutch was generally low, and

there was some consensus notion that the Dutch work hard and do well. Supported both by New Zealand and by Dutch policies, the Dutch were keen on integration in the New Zealand society; geographically, they were spread all over New Zealand, and they made little attempt to cluster together. Dutch immigrant associations in 1997 only numbered some 1700 members at a total Dutch born population of 25 000. Only a small minority of the second generation speaks Dutch.

As the data show, in all some 41 000 Dutch immigrated to New Zealand between 1947 and 1997. The Dutch immigrant population numbers about 25 000 in 1997. Over the postwar period 3 000 Dutch have died in New Zealand. Hence, out of the 41 000 some 13 000 have left the country, many going back to Holland, but others moving on to other immigration countries like Australia or Canada.

Elich and Blauw (1981) is the only study that looks specifically at Dutch return migration from New Zealand. In 1980, they traced the return migrants from two emigrant cohorts and found that about a third had returned to Holland (36% for the 1970 cohort and 33% for the 1975 cohort). The estimate of a third squares nicely with the aggregate estimate cited above and also suggests that most return migration takes place in the first 5 years. Their combined Canada/Australia/New Zealand sample is strongly unimodal at about 3 years after migration.

Elich and Blauw asked the returned migrants for their motives to return. 'Personal problems' (problems with relatives back home, with the partner, children, or language) are altogether mentioned by 51% of the returned migrants. Among *stated* motives, lack of economic success is not dominant. 64% evaluate their migration positively and their return not negatively. Only 8% ex post regret their migration, 18% regret having returned. If one were to take these answers at face value, there would be no need for great concern for selective return migration if one studies economic success. But of course, stated motives may not tell the true story.

As Fig. 2 shows, per capita growth in The Netherlands was much stronger than in New Zealand, in particular up to the late 1970's. This has continuously undermined the position of New Zealand as an attractive destination for Dutch emigrants motivated by material welfare. New Zealand relative national income after 1975 hovered around a third of its 1950 value. The index of the real exchange rate (Dutch guilders per New Zealand dollar multiplied by New Zealand over Dutch price level) mirrored this development quite faithfully. The Dutch who moved to New Zealand in the early fifties moved to a high income country; if they stayed, this advantage was more than wiped out over the next decades. Those who came later, moved from a high income to a low income country.

Income dispersion may be a particularly relevant variable to understand mobility patterns. Economic opportunity, the possibility to realise the market value of endowments and acquired skills, may differ substantially between countries, and a crude indication of such opportunities is given by measures of income dispersion. It has been predicted that migration from high dispersion to low dispersion countries will primarily consist of low skilled workers, since they in particular stand to gain from the move, while migration from low dispersion to high dispersion economies should be dominated by high skilled workers. Income inequality in the Netherlands is well documented[3], but data on New Zealand only start in 1984. The evidence suggests

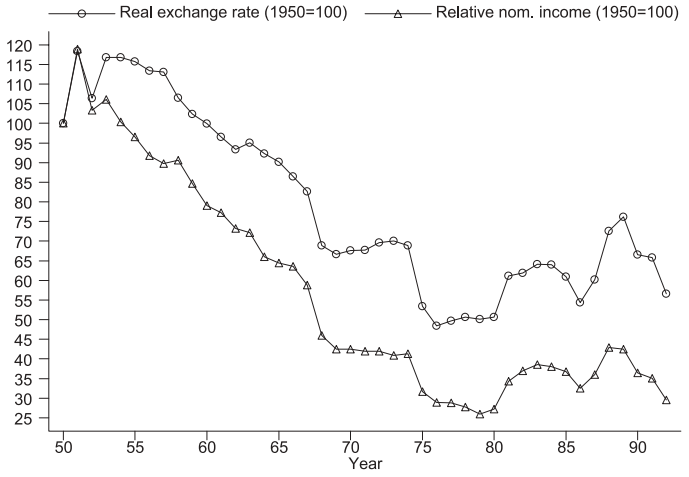

Fig. 2. Nominal per capita income in New Zealand relative to nominal per capita income in The Netherlands and real exchange rate

that New Zealand has a more unequal distribution than the Netherlands. Atkinson et al. (1995) give data on disposable income per equivalent adult. P_{10}, the income at the lowest decile relative to the median, is 61.5 in the Netherlands and 53.6 in New Zealand (in 1987), and P_{90} is 175.0 for the Netherlands and 186.6 for New Zealand, giving P_{90}/P_{10} ratio's of 2.85 and 3.48.

Sylvia Dixon (1998) documents earnings inequality in New Zealand for the period 1984–1997. Inequality in hourly earnings clearly is trended upward during that period, both for men and for women. Applying similar calculations for The Netherlands[4] shows that in the late 1980's and mid 1990's, inequality is higher in New Zealand. For emigration after the late 1980's one would thus predict it to be predominantly from the top end of the earnings distribution, as they would have better opportunities in New Zealand than in The Netherlands. Expenditures on social programs among the non-aged amounted to 3% percent of GDP in New Zealand (in 1979), and over 12% in the Netherlands (Gottschalk and Smeeding 1997; Chart 2). This suggests better social protection at the low end in The Netherlands, and also would favour emigration from the top end rather than from the bottom end. It is hard to assess the situation in earlier decades, for simple lack of data for New Zealand. For The Netherlands, we know that inequality between the 1950's and the late 1980's has declined substantially. In fact, Gould (1982, pp 32–36) presents some evidence that up until the 1970's income inequality was larger in The Netherlands than in New Zealand. This would c.p. predict migration to be from the low end of the Dutch skill distribution.[5]

The development in aggregate unemployment rates only started to diverge after the mid-eighties. Until that time, both rates were low, with the Dutch rate consistently above the New Zealand rate. After the late seventies, both rates soared up, but the Dutch rate took a sharp decline after 1984 and since 1989 is substantially lower than in New Zealand. We would expect the

relative unemployment rates also to be an important determinant of the emigration flows.

3. Analysing the migration decision: the role of age

In a present-value-maximizing framework, the comparative statics of the migration decision are fairly staightforward.[6] However, the effect of age is not unambigious, in contrast to the genreal intuitive notion that migration, if considered at all, should be undertaken as young as possible. This is not true in general. We will spell out the effect of age in some detail and also focus on it in our empirical analysis.

With A for age at migration, W_{Ht} for wage in homeland Holland at age t, W_{ZAt} for wage in destination New Zealand at age t when migrating at age A, and defining C as the monetary equivalent of the once-over utility effect of moving to the destination country, the present value for working in the homeland until A and then emigrating reads

$$PV_A = \int_O^A W_{Ht} e^{-\rho t}\, dt + \int_A^T W_{ZAt} e^{-\rho t}\, dt - C_A e^{-\rho A} \tag{1}$$

To find the optimum planned migration age, set the derivative to A equal to zero and rewrite:

$$\left\{ W_{HA} + \left(\rho - \frac{C_A'}{C_A} \right) C_A \right\} e^{-\rho A} = W_{ZAA} e^{-\rho A} - \int_A^T \frac{\partial W_{ZAt}}{\partial A} e^{-\rho t}\, dt \tag{2}$$

The left-hand side gives the marginal benefit of increasing A: staying longer in Holland gains the extra wage (discounted) and postpones the incurrence of migration cost C_A. The marginal cost of later migration, at the right-hand side, entails not receiving the New Zealand starting wage W_{ZAA} reduced by the effect of later migration on later wages (which is usually negative, hence the marginal cost is increased by additional reduction of all future wages in the destination country).

Equation (2) allows for many results and all of them may have empirical validity, depending on the actual circumstances. There may be corner solutions. Marginal benefit may always be higher than marginal cost, and hence, there will be no migration: postponing migration always adds more in the homeland than in the destination country. Or the other way round: later migration always gives higher marginal cost than marginal benefit, and migration takes place at age zero. Or the curves may cross twice. Marginal cost, starting below marginal benefits, may be low initially if the starting wage in the destination country is not too high, increase rapidly because of the discounted total wage loss from later migration and then decrease because discounting dominates. Migration would then be planned at the first crossing.

A "well-behaved" interior optimum is also conceivable. Marginal benefits starting out above marginal cost may decline if a high discount rate outstrips

wage growth in the homeland. Marginal cost may increase if post-migration wages fall steeply with later migration. Under special conditions, there is even a very elegant implication. Suppose that destination country wages are not sensitive to age at migration (i.e. the term under the integral is zero). Then, the optimal age at migration is located where the wage gap $W_{ZAA} - W_{HA}$ equals the return on the migration cost $C_A : \rho$ reduced by relative change in migration cost:

$$W_{ZAA} - W_{HA} = \left(\rho - \frac{C'_A}{C_A}\right) C_A \tag{3}$$

There is international evidence that immigrant wages upon entry typically show a dip relative to natives' wages that may be made up in subsequent years. We can easily include this effect, by rewriting the destination wage as a maximum potential wage at the earliest possible migration and a loss relative to that wage. The former may be equal to the natives' wage, but it need not. Hence, let's decompose the immigrant's wage profile in a wage that would be realised at age t if migrating at $A = 0$ (W_{Zt}) and a loss that is a fraction of this wage: $\delta_{A,f}$, the fraction of this wage lost at age f when arriving at age A. $\delta_{A,A}$ is the initial dip, $\delta_{A,f}$ decreases for increasing f and reaches zero at $A + F$ (where F is the time needed for catching up). Of course, $A + F$ may be greater than T (age of retirement), and the wage never fully catches up. But for the case where $A + F < T$, and $\delta_{A,A+F} = 0$ can be realised, we may write condition (2) for optimum planned age at migration as

$$\left\{W_{HA} + \left(\rho - \frac{C'_A}{C_A}\right) C_A\right\} e^{-\rho A} = (1 - \delta_{AA}) W_{ZA} e^{-\rho A} + \int_A^{A+F} W_{Zt} \frac{\partial \delta_{At}}{\partial A} e^{\rho t}\, dt \tag{4}$$

Again, the outcome is not obvious. The unspecified age sensitivity of wages combined with discounting makes for unpredictable outcomes[7]. The impact of the Entrant wage loss on the optimal migration age depends on the relative magnitude of initial loss and cumulated later loss. Without Entrant loss ($\delta_{st} = 0$, all s, t) and without migration cost ($C_A = 0$), in a well-behaved interior solution, the planned migration age would be at $W_{HA} = W_{ZA}$, assuming W_{ZA} (marginal cost) increases faster than W_{HA} (marginal benefit): move as soon as the destination wage surpasses the homeland wage. The initial earnings dip δ_{AA} reduces marginal cost, and hence increases planned age of migration. But later losses (δ_{At}) increase the marginal cost, and hence, decrease planned migration age. The unpredictable balance of the two determines the outcome.

As noted, there is a general, intuitive notion that migration if considered at all, is best undertaken at the youngest possible age (e.g. straight after completing education, although education of course may also be completed abroad). But as the above analysis indicates this holds only under restrictive conditions[8]. For example, Schwartz (1976) indeed predicts that the rate of migration declines with age. But he imposes that the benefit from migration at a given age (the difference between the wage rate in both countries) declines, at every age, for any postponement of migration. This

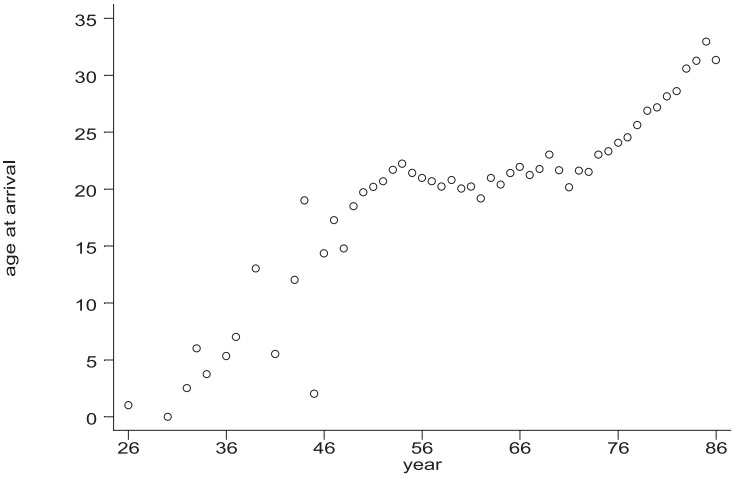

Fig. 3. Sample mean age at arrival by year of arrival (Dutch working-age immigrants in 1986 census)

condition appears not to be met in our data (see later). We will return to the age-effect in our empirical section. The effect of age on migration turns out to be complicated, and can only be predicted under very specific conditions, even in a deterministic framework. It may differ between different types of potential migrants, such as migrants between countries with very large wage differentials (the initial New Zealand-Netherlands comparison) and potential movers in an international professional labour market such as now emerging in the European Union.[9]

4. Data and descriptive analysis

The Dutch dataset is the OSA sample, a national representative household panel survey. Within each household all members aged between 16 and 64 were interviewed. The panel started in 1985. Attrition has been countered by selective addition of households to maintain a representative sample of the Dutch labour force. The 1986 sample contains 2452 households. We will use the 1986 sample, to match the New Zealand dataset for that year.

The New Zealand dataset is derived from the 1986 Population Census. It includes the whole population of working age migrants (those aged 15–64), and a 5% random sample of the New Zealand born working age population. Immigrants are identified by their country of birth rather than by their residence status (i.e. they could have adopted New Zealand citizenship, be permanent residents or on temporary permits). Visitors are excluded from the sample. We preferred the 1986 Census to later Census years, since most Dutch immigration took place in the 1950s and the number of enumerated Dutch migrants declines steadily over time (The overall number of Dutch working age immigrants fell from 20196 in 1986 to 15153 in 1996).

The sample distribution by year of arrival is fairly uniform except for a marked peak in the period 1951–1954. The age distribution by arrival year as we observe it in our sample is transformed asymmetrically by mortality and is

truncated because of the age restriction in the sample (15–64). This is shown clearly in Fig. 3. For arrival cohorts between the mid-forties and the mid-seventies, the average age at arrival is quite stable at about 20–22. For older and younger arrival cohorts the sample truncation ages affect the average age. For older cohorts still to be in the sample, they must have come at younger and younger ages (if you go backwards), for more recent cohorts they cannot be included if they are too young. For older cohorts, average age moves up from the upper boundary constraint, for younger cohorts average age moves up from the lower boundary. Conditioning on arrival cohort we observe that most immigrants have come at young ages. But there is still a fair amount of dispersion and the arrival age is not uniquely low as for example schooling ages are. In the latest cohort (arrival between 1977 and 1986), almost 30% of the immigrants arrived at ages above 34. The ''moving boundary'' does not create an additional problem of endogenous sample selection. The only endogenous sample selection rule is the immigration decision. A person born before 1922 cannot be in the immigrant sample in 1986, because he is then over 64. Anyone born after 1972 cannot be in the sample, because in 1986 he is under 15. But those born before 1922 or after 1972 cannot be in the non-migrant sample either, for the same reason. There is no additional endogenous selection problem.

The samples are characterised in the Appendix. The Dutch in New Zealand are old both relative to Dutch in The Netherlands and to the native New Zealanders, reflecting the presence of a large stock of older immigrants, i.e. the reduction of immigration flows in later years. On average the immigrants have been in New Zealand for some 22–23 years. The Dutch in New Zealand work substantially more hours than the Dutch in the Netherlands, reflecting their adjustment to the New Zealand standard. The immigrants are disproportionately selfemployed, calling for separate analyses of employees and selfemployed. They also have lower unemployment rates than native New Zealanders. Similarly, male migrants have on average a substantial income advantage of 16 log-points over native men. For women, the opposite is observed as the average income of a migrant woman is 7 log-points below the income of a native woman. These comparisons are problematic, of course, as they are not adjusted for differences in age, education, and other factors. Also, a direct comparison between Dutch and New Zealand income is not meaningful, first, because incomes are measured in local currency, and second, because Dutch numbers give gross monthly income whereas the New Zealand numbers give the gross annual income.

The share of Dutch male immigrants in agriculture is much higher than in The Netherlands, but it is quite close to the New Zealander's share. Female immigrants are more active in agriculture than native New Zealand women. The Dutch in New Zealand have substantially less education than the Dutch in the Netherlands. This fits in with the hypothesis on the relation between the skill level of migrants in relation to income dispersion. Since schooling levels have risen considerably over time, we considered education levels by age interval, and then the relation still holds: in all intervals, migrants have less education than non-migrants.

In our empirical analyses, we will only consider employees. We are compelled to ignore the issue of selectivity as an employee rather than being self-employed. The dataset simply does not contain variables that relate to

self-employment status without affecting earnings. Moreover, properly measuring earnings from self-employment is quite problematic.

5. Empirical modelling of migrants' wages: selected issues

In this section we discuss the joint modelling of wages of non-migrants (the Dutch in the Netherlands), migrants (Dutch-born residents of New Zealand), and the decision to migrate. A natural starting point is a canonical switching regression model with normality (e.g., Roy 1951; Quandt 1972). We show that the extreme imbalance between migrants and non-migrants reduces the usefulness of this model in the context of international migration. In our view, this issue has not received sufficient attention in the previous literature.

Given the empirical limitations for modelling selection on unobservables, we then focus our analysis on measuring selection on observables. Furthermore, we introduce a non-standard model for the migration equation in form of a discrete-time hazard model for the decision to migrate at age t. Because for each person, calendar time and age move synchronously, the discrete-time hazard model offers a straightforward way to introduce macro-economic variables.

To see why the switching regression model is ill-suited in the present context, consider the following standard set-up

$$W_{Hi} = x_i'\beta_H + u_{Hi} \tag{5}$$

$$W_{Zi} = x_i'\beta_Z + u_{Zi} \tag{6}$$

$$M_i^* = z_i'\gamma + u_i \tag{7}$$

where W_{Hi} is the (logarithmic) wage in the homeland (Holland) and W_{Zi} is the (logarithmic) wage in the destination country (New Zealand), and u_i, u_{Hi} and u_{Zi} have a trivariate normal distribution with mean vector zero and non-zero covariances σ_{Hu}, σ_{Zu} and σ_{HZ}. W_{Hi} is observed for non-migrants and W_{Zi} for migrants so that we have

$$W_i = M_i W_{Zi} + (1 - M_i) W_{Hi} \tag{8}$$

where $M_i = \mathbf{1}\,(M_i^* \geq 0)$ and W_i is the observed wage. Unless there is statistical independence between the error in the migration equation and the error in the wage equation, separate estimation of each wage equation on the subset of observed wages will produce biased estimates of β. Two-stage or FML estimation of the joint model avoids this bias. Moreover, it potentially provides valuable information on the type of selection on unobservables. This information can be of substantive independent interest (i.e., as it may reveal something about the "quality-effects" of immigration policy). Of course, all inferences depend on the validity of the maintained model. As we show now, the model may be seriously deficient if the size of the populations observed in each of the two regimes is very unequal.

Migration to New Zealand is a very rare event. The Netherlands have a population of around 15 million, about 2/3 of which is of working age. In 1986 there were approximately 20,000 Dutch working-age migrants in

New Zealand, i.e., the ratio of migrants to non-migrants is 1–500 and the unconditional probability of being a migrant is 0.2%. Under normality, the expected wage in Holland for those who stay can be written as

$$E(W_{Hi} \mid u_i < -z_i'\gamma) = x_i'\beta_H - \frac{\sigma_{Hu}}{\sigma_u} \frac{\phi(z_i'\gamma)}{1 - \Phi(z_i'\gamma)} \tag{9}$$

where ϕ and Φ are the density and cumulative density functions of the standard normal distribution, respectively. The denominator of the last term gives the probability of staying in Holland. It depends on the value of the index function $z_i'\gamma$. Ideally, if the migration equation could perfectly discriminate between movers and non-movers, the probability should be very close to one for those who actually stay (i.e., the index function approaches minus infinity). In the absence of good instruments, such as in the extreme case of a constant only migration equation, the probability of staying must approach the proportion of stayers in the population, the aforementioned 0.998, again almost one. Moreover

$$\lim_{z_i'\gamma \to -\infty} \frac{\phi(z_i'\gamma)}{1 - \Phi(z_i'\gamma)} = 0 \tag{10}$$

Hence, the overall conditional expectation in Eq. (9) that is consistent with the data approaches zero. For the typical individual, conditional and unconditional expectations are approximately the same, regardless of the correlation between the migration equation and the wage equation and the quality of the selection equation. Less formally, since most people are non-migrants, the stayer condition $u_i < -z_i'\gamma$ cannot be very binding on average. As a consequence, the conditional expectation $E(u_{Hi} \mid u_i < -z_i'\gamma)$ and the marginal expectation $E[E(u_{Hi}|u_i)] = 0$ are almost the same.

While this result does not matter much for the interpretation of the results of non-migrants (indeed – who ever reported a national earnings function with correction for selective outmigration?), it gives rise to extraordinary counterfactual wages of movers. In particular, consider the counterfactual wage equation of migrants had they stayed in Holland. Again, using the standard formula, it holds that

$$E(W_{Hi} \mid u_i \geq -z_i'\gamma) = x_i'\beta_H + \frac{\sigma_{Hu}}{\sigma_u} \frac{\phi(z_i'\gamma)}{\Phi(z_i'\gamma)} \tag{11}$$

The denominator of the second expression now gives the probability of being a migrant. As before, the expression depends on the value of the index function $z_i'\gamma$. Two extreme cases are possible. In a first case, the migration equation perfectly discriminates between migrants and non-migrants. The probability of migration for migrants is close to one, and the counterfactual wage Eq. (11) is approximately equal to the wage of non-migrants. In practice more relevant is a second case, in which the migration equation discriminates poorly between migrants and non-migrants. In the extreme, no suitable instruments are at hand and all the selection is on unobservables. With a constant probability of being a migrant, in our case 0.002 (the proportion of migrants in the Dutch population), the value of the Mills ratio in Eq. (11) exceeds 3 and selection effects are large even for moderate values of σ_{Hu}/σ_u.

The underlying mechanism can also be illustrated by considering the conditional expectation function of the bivariate normal which is linear:

$$E(W_{Hi}|u_i) = x_i'\beta_H + \frac{\sigma_{Hu}}{\sigma_u^2}u_i$$

One immediate result is that if σ_{Hu} is nonzero, then $E(W_{Hi}|u_i)$ goes to negative or positive infinity as u_i goes to infinity. In the limit, for any distribution of $z_i'\gamma$, if the probability of migration goes to zero, then only those with arbitrarily large values of u_i decide to migrate and the conditional expectation will go to positive or negative infinity by the linearity of the conditional expectation for bivariate normal distributions, unless the covariance is zero.

For non-limit considerations, the magnitude of the overall selection effect depends on the absolute value of the ratio σ_{Hu}/σ_u. In order to calibrate a range of possible magnitudes of this ratio, one has to be more specific about the nature of the migration decision. In the classical Roy model, as applied for instance by Borjas (1987) to the migration decision, people act on income gains net of migration cost, i.e., $M_i^* = x_i'(\beta_Z - \beta_H) - C_i + u_{Zi} - u_{Hi}$. First, assume that migration cost are constant and that u_Z and u_H are perfectly correlated, i.e. $\sigma_{HZ} = \sigma_H\sigma_Z$. The latter assumption may be a reasonable approximation for migration between two OECD countries, as conjectured by Borjas (1987) (formally, the correlation is not identified in the switching regression model since individuals are never observed in both states). Then

$$\frac{\sigma_{Hu}}{\sigma_u} = \frac{\sigma_{HZ} - \sigma_H^2}{\text{sqrt}(\sigma_H^2 - 2\sigma_{HZ} + \sigma_Z^2)} = (\text{sgn}[\sigma_Z - \sigma_H])\sigma_H \tag{12}$$

In the Dutch/New Zealand scenario this means that for a value of $\sigma_H = 0.5$, say, the counterfactual wages of migrants in the Netherlands will be 150 log points below or above those of an average Dutch worker. To us, such large selection effects are completely implausible. To "rescue" the model, one can introduce individual heterogeneity in migration cost, for instance due to differences in psychological disposition. The mere geographic distance between the Netherlands and New Zealand means that it is difficult to maintain close family ties after migration. Life-style may be a more important consideration to others. Now

$$\frac{\sigma_{Hu}}{\sigma_u} = \frac{\sigma_{HZ} - \sigma_H^2 - \sigma_{HC}}{\text{sqrt}(\sigma_H^2 + \sigma_Z^2 + \sigma_C^2 - 2\sigma_{HZ} - 2\sigma_{HC} + 2\sigma_{ZC})} \tag{13}$$

Thus, the model can be reconciled with the data if the migration decision is largely driven by migration cost. If migration costs have a large variance and are mostly unrelated to wages ($\sigma_{HC} = \sigma_{ZC} = 0$), then the ratio Eq. (13) will be close to zero. But in this case, the switching regression model is driven mainly by an exogenous factor and the case for joint estimation is less compelling in the first place.

To summarize, the strong assumptions of the switching regression model with normality has implications that are a-priori implausible in our application. One might attempt to salvage the model by choosing other error distributions. We don't think, however, that this approach is promising. Rather,

we take the migration decision to be exogenous with respect to wages and consequently report single equation estimates of Eqs. (5)–(7), thereby addressing the other aspect of immigration choice, selection on observables.

In doing so, we use some non-standard functions for Eq. (6) and Eq. (7) in order to obtain as much information as possible. For migrants, we modify the standard earnings function,

$$W_i = \beta_0 + \beta_1 ys_i + \beta_2 t_i + \beta_3 t_i^2 + u_i \tag{14}$$

where "ys" stands for years of schooling and "t" for age. Using the identity $t = A + (t - A)$, where $(t - A)$ is years since migration, i.e., experience in the New Zealand labor market, it follows that

$$\begin{aligned} W_{Zi} = {} & \gamma_0 + \gamma_1 ys_i + \gamma_2 A + \gamma_3 (t_i - A_i) + \gamma_4 A_i^2 \\ & + \gamma_5 (t_i - A_i)^2 + \gamma_6 A_i (t_i - A_i) + u_{Zi} \end{aligned} \tag{15}$$

This generalization makes it possible to distinguish between the returns to experience gained in the Netherlands before migration and the returns to experience in New Zealand, as in the model in Sect. 3. The two are the same as long as $\gamma_2 = \gamma_3$ and $2\gamma_4 = 2\gamma_5 = \gamma_6$, a set of restrictions that can be tested. In the more general model, age-earnings profiles depend on the age at arrival in New Zealand, just as we discussed in Sect. 3. For instance, one can test whether the earnings dip is larger for older migrants who experience relatively faster subsequent earnings growth than younger migrants.

To explicitly account for age-dependence of the migration decision, as laid out in Sect. 3 of our paper, we model the duration until migration using a discrete time hazard model with time-varying covariates (e.g., Allison 1984). The risk set includes all people of a certain age who have not yet migrated by that age. The decision of moving to New Zealand at age A, given that a person lived in Holland up to age $A - 1$, is assumed to be determined by the latent model

$$M_t = 1 \quad \text{if } h(A_i) + \beta_1 x_{1i} + \beta_2 x_{2i}(A_i + c_i) + u_i > 0 \tag{16}$$

$h(A)$ measures the variation in the hazard over the life-cycle. Two parameterizations are considered. In a first, $h(A)$ is a fourth-order polynomial in A. In a second, an age specific intercept is estimated without further restriction. x_1 are age invariant variables such as gender and education (which is assumed to be completed before the decision to migrate is made). $x_2(A + c)$ includes indicators of the relative economic conditions in the two countries at the time of migration (c is the cohort (birth year) such that $A + c$ is the year of migration).

For estimation, we generate a combined sample of Dutch in the Netherlands and Dutch in New Zealand. The first group constitutes the part of the risk group that never migrated. For each age (beyond 15) a separate record is created. For instance, for a Dutch resident aged 40 in 1986, it is known that she did not migrate at age 20, nor at age 21, or 22 and so forth. The decision-relevant variables at age 20 were her personal (invariant) characteristics and the macro-conditions in 1966. The comparison group is made up of people who did migrate at age A. These are only included once, at the age they came to New Zealand. In principle, pre-migration observations of migrants (when

Table 1. New Zealand earnings functions: immigrants and natives

	Men	Women
Years of schooling	0.0665	0.0742
	(0.0010)	(0.0020)
Experience	0.0645	0.0324
	(0.0009)	(0.0016)
Experience squared	−0.0011	−0.0005
	(0.0000)	(0.0000)
Married	0.2073	−0.2868
	(0.0074)	(0.0124)
Immigrant	−0.1528	−0.3150
	(0.0154)	(0.0317)
Years of migration	0.0028	0.0054
	(0.0006)	(0.0014)
Constant	8.3214	8.2723
	(0.0128)	(0.0245)
Observations	33222	24732
R-squared number of observations	0.35	0.08

Standard errors in parentheses.
Source: OSA 1986 and New Zealand Census 1986. All employees. No weights. Dependent variable is logarithmic annual earnings.

they were aged $A-1, A-2, \ldots$) could be included in the risk set. However, migrants are over-sampled, whereas the Dutch sample is representative for the population in the Netherlands, and therefore more appropriate.

6. Results

We start out, in Table 1, with a standard "assimilation" earnings function for New Zealand, where we include natives and immigrants in one regression equation, with a dummy for migrants, for men and for women.[10] Returns to schooling are about 7%. The effect of potential experience (age minus schooling minus 6) is virtually log-linear and markedly lower for women. The position of women further deviates from that for men with a penalty for marriage rather than a bonus. This clearly suggests that married women are restricted in their choices compared to single women.[11]

The migrant earnings dip is substantial[12], at 15% to over 30%, and a catch-up rate on years since migration that is too slow to ever really make up for the loss[13]. Note that even for the best migrants, the prospects are poor. If we take "best" to mean an initial earnings loss two standard deviations smaller than the average migrant and a catch-up rate two standard deviations higher, these "best" men and women would still need some 30 years of New Zealand experience to wipe out the gap.

In Table 2 we compare earnings for the Dutch who choose to remain in Holland and for those who migrated to New Zealand. Rates of return to schooling are higher in Holland than in New Zealand, so we expect migrants to be lower educated. The prediction of predominantly lower educated to migrate is borne out in the statistics we discussed earlier. Note that the lower returns to schooling only hold for migrants: New Zealanders in New Zealand have a higher return than Dutch in Holland. The lower return to schooling

Table 2. Earnings functions for Dutch in The Netherlands and Dutch in New Zealand[a]

	Men in NL	Men in NZ	Men in NZ	Women in NL	Women in NZ	Women in NZ
Years of schooling	0.0575	0.0454	0.0446	0.0680	0.0597	0.0586
	(0.0030)	(0.0025)	(0.0025)	(0.0102)	(0.0062)	(0.0062)
Experience	0.0488	0.0546		0.0089	0.0152	
	(0.0027)	(0.0023)		(0.0074)	(0.0052)	
Experience squared	−0.0008	−0.0009		−0.0004	−0.0002	
	(0.0001)	(0.0000)		(0.0002)	(0.0001)	
Married	0.1397	0.2142	0.2128	−0.2663	−0.3745	−0.3548
	(0.0214)	(0.0174)	(0.0173)	(0.0518)	(0.0398)	(0.0398)
NL experience			0.0522			0.0115
			(0.0023)			(0.0052)
NL experience squ.			−0.0006			−0.0003
			(0.0001)			(0.0001)
NZ experience			0.0620			0.0247
			(0.0031)			(0.0076)
NZ experience squ.			−0.0010			−0.0003
			(0.0001)			(0.0002)
NL exp. * NZ Exp.			−0.0019			−0.0005
			(0.0001)			(0.0002)
Constant	6.3395	8.5698	8.4556	6.3220	8.4713	8.3716
	(0.0450)	(0.0355)	(0.0395)	(0.1381)	(0.0861)	(0.0980)
Observations	1485	6203	6203	803	3184	3184
R-squared	0.42	0.22	0.23	0.12	0.05	0.07

[a] Earnings in The Netherlands is monthly income in Dutch guilders, earnings in New Zealand is annual income in New Zealand dollars. Dependent variable is log earnings. Standards errors in parentheses.

for migrants in New Zealand than in The Netherlands has an interesting implication: the penalty for dropping out from school is lower in New Zealand. Often, the argument is made that in countries like New Zealand, less regulated than The Netherlands, it is easier to make a career without a school diploma. While we have no results specifically for school drop-outs the results suggest that in relative terms there may be some validity in the argument. Proficiency in the English language is not included in the equation as this question was not contained in the 1986 census. Moreover, we know from the 1996 census, where a self-evaluation was given, that virtually all Dutch immigrants claim good proficiency (Winkelmann and Winkelmann 1998). The marriage premium for men is lower in Holland, for women it is higher in Holland, generating the expectation that male migrants will be married, while female migrants will not.

Dutch experience is about equally rewarded in the Netherlands and in New Zealand, but at a substantially lower rate for women than for men. This implies that the migrant earnings ratio between New Zealand and The Netherlands (New Zealand earnings at entry relative to earnings left behind in Holland) is not sensitive to age at migration. The returns to experience gained in New Zealand are higher than the New Zealand returns to Dutch experience. Both for men and for women, the difference is about 1 percentage point per year. For men, age at migration has a substantial effect on returns to New Zealand experience. As the interaction term indicates, migrating 10 years later reduces the returns to New Zealand experience by

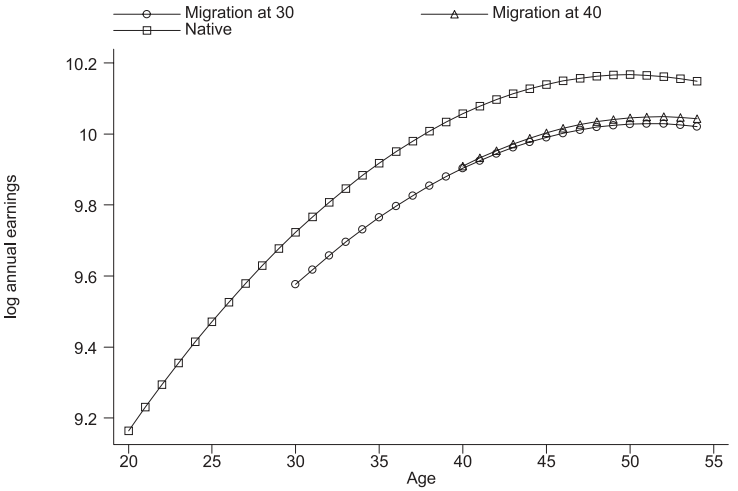

Fig. 4. Predicted male earnings profiles

Table 3. Decision to emigrate at age A: probit results (discrete time hazard model; employees only)

	Men		Women	
	(1)	(2)	(1)	(2)
Years of schooling	−0.0020	−0.0019	−0.0290	−0.0286
	(0.0016)	(0.0016)	(0.0034)	(0.0034)
Unemployment in Holland	0.0566	0.0554	0.0428	0.0423
	(0.0030)	(0.0030)	(0.0055)	(0.0056)
Unemployment in New Zealand	−0.0619	−0.0603	−0.0297	−0.0285
	(0.0061)	(0.0061)	(0.0114)	(0.0114)
Relative income	1.7815	1.7669	1.9467	1.9636
	(0.0269)	(0.0268)	(0.0531)	(0.0535)
Occupation: professional	−0.0562	−0.0549	−0.1710	−0.1749
	(0.0108)	(0.0108)	(0.0283)	(0.0284)
Occupation: service	−0.1011	−0.1006	−0.2387	−0.2400
	(0.0100)	(0.0101)	(0.0219)	(0.0220)
Occupation: agriculture	0.4200	0.4176	0.3061	0.3017
	(0.0189)	(0.0190)	(0.0415)	(0.0418)
Age polynomial	yes	no	yes	no
Age dummies	no	yes	no	yes
Log-likelihood	−43692.2	−43595.6	−13401.9	−13338.9

Notes: Sample: Male, age > 15, the reference category is blue collar jobs.
All models are estimated using population weights.

some 2 percentage points per year. Yet, putting all things together, in levels there is only a modest effect of later migration (Fig. 4). For women, the effect of later migration on earnings growth is negligible.

In Table 3 we present a probit analysis for the country of residence: the decision to have migrated and not returned to Holland. We used population

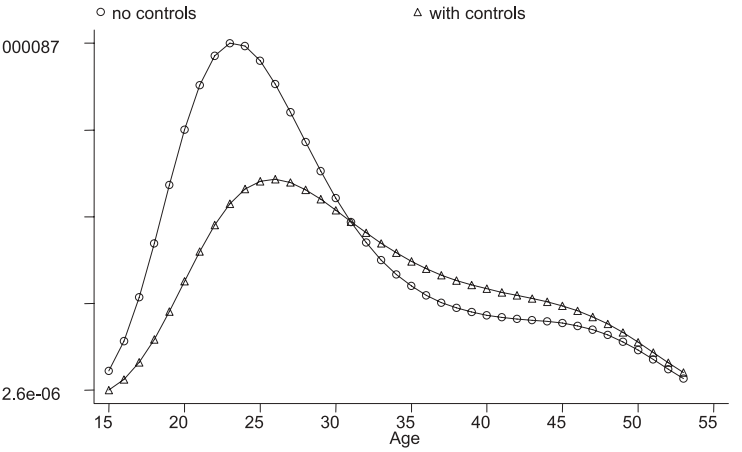

Fig. 5. Probability of migration by age, polynomial

weights for the observations, as the Dutch sample of non-migrants (OSA) is relatively much smaller than the sample of Dutch migrants in New Zealand (see Sect. 4). As anticipated, we find a negative effect of schooling (significant only for women), reinforced by the negative effect of having a professional (high-education) occupation. Also as anticipated, we find a strong positive effect of having an agricultural occupation. The effect of macroeconomic conditions in the two countries perfectly matches theoretical predictions: unemployment in Holland stimulates emigration, unemployment in New Zealand reduces it, and a high relative income in New Zealand also stimulates emigration.

In Fig. 5, we have plotted the probability to migrate by age as implied by the estimated probit model. Without controls, the probability peaks just before age 25, when we standardize by taking the age effect net of controls we find a much flatter age pattern, and a peak shifted upwards by several years. Note that this is at variance with the notion of migrating as young as possible, and an inclination to migrate that falls continuously with age, as Schwartz (1976) claimed. The age effect on migration is certainly not unequivocal, just as we anticipated in Sect. 3.

7. So, did they fare well?

With our estimation results available, we will now give a partial answer to the question that motivated our paper: how well off is a migrant due to migration? For the wage structures observed in 1986, we calculated net present values of lifetime wages, discounted at 10%. We use a standard immigrant: male[14], married, 10 years of schooling, migrating at age 20 in 1950. All annual earnings are converted into Dutch guilders. The conversion factor we use is the ratio of average nominal per capita GDP in New Zealand evaluated at the exchange rate of the year in which earnings are assumed to have been generated, to average nominal per capita GDP in Holland, normalized so that the value is one in 1986 (when we observe the data). That is, we take the

Table 4. Net present-values with and without migration for Dutch males aged 20 in 1950 in Dutch Guilders

Net present value in The Netherlands	50240
Net present value in New Zealand, converted at 1950 exchange rate	118131
Net present value in New Zealand, converted at current (yearly) exchange rates	87831

Note: Computations are based on columns 1 and 3 of Table 2 (men). The discount rate is 10%. The hypothetical worker is married and has 10 years of schooling.

wage structures in each country as observed in our 1986 regression and adjust them for each country to particular years by applying the index of the country's average income, thus assuming that nominal wage growth does not disturb the 1986 wage structure. This gives us an indication of the present values of nominal incomes that actually accrued (or would have accrued in the other country). We don't correct for inflation: in the migration analysis, only relative inflation in both countries is relevant, and this is accounted for in our conversion.[15] We also make a calculation where we freeze the conversion factor at the value for 1950, the presumed year of migration: this may serve as an indication of what migrants could have anticipated at unchanged 1986 wage structure and relative income levels constant for the rest of their working lives. Results are collected in Table 4.

Our typical male migrant may have anticipated a substantial gain in lifetime earnings from his move to New Zealand. At the wage structures in 1986 (the only ones we observed) and the conversion factor for per capita incomes in 1950, he thought to more than double his present value. The actual aggregate development was quite a deception, as his lifetime earnings in New Zealand were 25% lower than he might have anticipated in 1950. Yet, over the course of his life, the 1950 migrant is still better off, with lifetime earnings 75% higher in New Zealand than in The Netherlands. The gains in the early years have been high enough to outweigh the strong deterioration that occurred during the postwar period.

We have further analysed the age effect on migration in Fig. 6. In line with the analysis of the effect of age at migration in Sect. 3, we calculated two present values for a standard migrant (as in Table 4). For any given age at migration A, we calculate the present value of earnings up to age A in homeland Holland, and the present value of earnings beyond age A in destination country New Zealand (all discounted back to 0, i.e. age 20). Both curves are calculated in their national currencies. As Fig. 6a,b indicate, present value in Holland continuously increases with later migration, present value in New Zealand continuously declines with later migration. Total lifetime present value, for any age of switching from Holland to New Zealand, depends on the conversion rate of the two currencies (the relative weight of the two curves). In Fig. 6a, we use the 1950 conversion rate: 1 New Zealand dollar is 5.3 Dutch guilders. At that conversion rate, lifetime earnings monotonically decrease with advancing age of migration: the best decision is to migrate when starting working life. In Fig. 6b, with the 1986 conversion rate (1:1), lifetime earnings increase monotonically when postponing migration: the best decision is never to migrate. Implicitly, somewhere between 1950 and 1986 the conversion rate development switched

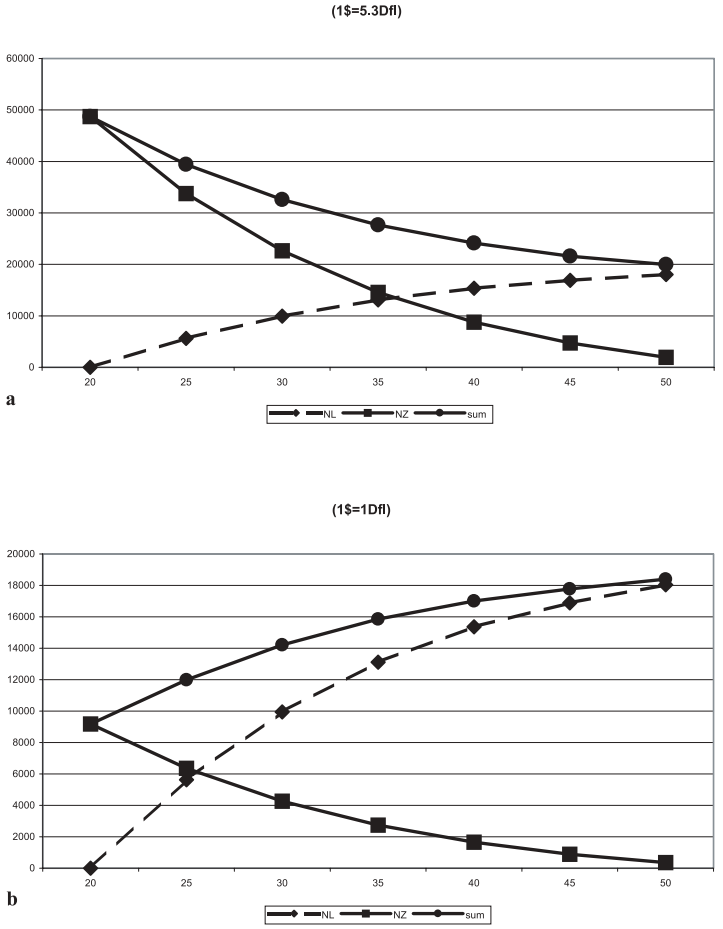

Fig. 6a, b. Net present values, by age at migration, Netherlands and New Zealand

the optimum from 'go young' to 'go never'. Conceptually, as anticipated in Sect. 3, the present value curves might have determined an interior solution for the optimal migration age. The actual present value curves turn out to be modestly non-linear and generate no parabolic shape for the aggregate.

The switch of the optimum decision for a typical male individual, from migration to no migration reiterates the results we obtained earlier in this paper, and anticipated in our introduction.[16] The ex post rationality of a 1950 migrant, in spite of the clear deterioration of New Zealand's relative income level surprised us. Of course, the calculations are buried under a load of special assumptions, and there may be much more individual variety than we could uncover. As a partial check on our results, we can compare with outcomes of a survey we organised among Dutch immigrants in New Zealand, by including a questionnaire in the newsletter of the federation of Dutch immigrant associations in late 1999. Unfortunately, response was modest and heavily dominated by the retired. We will elsewhere analyse the data in detail, but it is interesting to take a few results from that survey. The

sample size of the survey is 646, of which 60% had retired. Almost half of the respondents had a position waiting for them when they moved to New Zealand. The earnings gap relative to the position they left behind in Holland, according to the respondent's recollection, was very dispersed, but fairly symmetrically so. One quarter of them answered they experienced a drop of 25% or more, and almost another quarter gained 25% or more. 12% stayed about even, the intervals in between each took up roughly 10% (and 15% don't remember). Settling in certainly has not been easy, and fully three quarters of the respondents at some point had seriously considered returning. On average, it took respondents 6 years to get the feeling they had really settled in. For 45% it took no more than three years, for 71% no more than 5 years. Seriously considering to return is widely dispersed over years after arrival, but peaks at 1 year and 2 years (11% and 14%); half of the respondents have their heartache within 5 years[17] of arrival. This matches up with the observation that most return migration takes place within 5 years of arrival.

And how do the immigrants evaluate their move? In terms of income and financial wealth, the answers divide roughly equally over the three possible answers: 'I am better off than I would have been', 'about equal', 'I am worse off'. In a simple ordered probit regression, the perceived relative financial position deteriorates with year of arrival (holding age constant), i.e. those who arrived later are more likely to find themselves worse off than they would have been in Holland. This is precisely the conclusion we draw from Fig. 6. However, in overall quality of life, almost three quarters indicate that they are better off, and almost a quarter feels it's about the same as it might have been in Holland (only 6% feels worse off). While these answers are obviously coloured by selectivity and cognitive dissonance, they also reiterate the relevance of the broad comparison we set up in Eq. (1): it's not just wages that determine migration decisions.[18] This also supports our emphasis on "migration cost" rather than wage in the discussion of selectivity correction. However, including observations on such non-pecuniary cost and benefits is not easy, if only for simple lack of accessible data.

Endnotes

[1] This section is based on Priemus (1997). The general history of New Zealand immigration is reviewed and analysed in Winkelmann (2001a).

[2] In the 1950's, the big difference in industrial employment composition was for men in agriculture and manufacturing; the share of services was equal in both counties. For males, agriculture counted for 20% of employment in New Zealand in 1956, and for 13% in The Netherlands in 1960. Manufacturing counted for 24% in New Zealand and 33% in The Netherlands. Other shares in one-digit composition were virtually identical in both countries. For women, the compositions barely differed between the two countries. Sources: New Zealand Census 1956; Netherlands Census 1960.

[3] Hartog and Veenbergen (1981).

[4] We are grateful to Jeroen Smits, now at NIVROM, for his calculations.

[5] We are grateful to Jacques Poot, Victoria University at Wellington for this reference.

[6] Theoretical analysis of migration in general is given by Borjas (1999), focussing on selectivity effects according to the Roy model. Unobserved heterogeneity complicates the analysis. We will consider the Roy model in Sect. 5.

[7] The model is formally exactly equal to a model for the optimal planned age of maternity, with the same problem of an initial dip δ_{AA} and possible later catching up. For example,

Wetzels (1999) predicts maximum postponement of the birth of the first child from a model where $\delta_{A,A+F} = 0$ (always return to the no-maternity wage) and where the loss fraction δ_{AF} is not sensitive to the age at which labour market withdrawal starts (δ_{AF} is not sensitive to A).

[8] In CEPR Discussion Paper 2596 underlying this paper we also analysed a model where individuals at any age decide whether to migrate or not. The same ambiquity of the age effect results. In that model, the effect of the discount rate is also shown to be undetermined a priori.

[9] It may also be different for migrants who intend to return to their homeland, but we consider this to be less relevant for our case. On return migration, see Røed (2000) and Dustman and Kirchkamp (2001).

[10] Preferably, one would use hourly earnings as dependent variable. We did run such regressions, but many wages when turned into hourly rates were implausible (from a minimum of 0.1 dollar/hour to a maximum of 800 dollar/hour. Truncation of extreme values leads to results very sensitive to the points of truncation. We therefore decided to proceed with a simple robust specification. We may add that in an earlier specification, with log hours added as dependent variable, our final conclusions (Sect. 7) were no different.

[11] We only employ a limited number of explanatory variables, to avoid endogeneity problems as much as possible.

[12] The standard practice of interpreting predicted mean log-differences as percentage differences in means between groups is incorrect if the groups have unequal distribution of the dependent variable, as the transformation from mean $\log x$ to mean x is affected by dispersion of x as well. See Winkelmann (2001b). There is some evidence that, for men, wages of Dutch migrants are less dispersed than wages of New Zealand-born workers. The standard practice thus tends to underestimate the true percentage difference.

[13] This result is similar to Winkelmann (2000), using the same dataset.

[14] In 1950, with virtually zero participation rate for married women, male earnings will dominate in the migration decision.

[15] Our conversion is incorrect insofar as the price ratio between tradables and non-tradables develops differently between the two countries.

[16] Anticipated lifetime present values by age (year) of migration might be included in the migration probit. However, with relative national income per capita we already have included a key determinant of this comparison.

[17] The typing error of 'five tears' had great poetic charm, but alas, even when writing about drama we have to remain clinical.

[18] As pointed out to us by Jacques Poot, a study by the Dutch Ministry of Social Affairs (1981) found that relative to emigrants with destination Canada and Australia, emigrants to New Zealand put highest weight on environmental quality as a motive for their choice.

Appendix

Table A1. Descriptive statistics

	Male			Female		
	NL	NZ_mig	NZ_nat	NL	NZ_mig	NZ_nat
Age	38.484	46.293	34.565	36.278	43.858	34.826
	(11.314)	(12.701)	(13.897)	(11.109)	(12.848)	(13.885)
Years since migration		23.543			21.528	
		(11.310)			(11.218)	
Hours of work	39.401	45.623	45.396	27.665	32.695	34.384
	(7.423)	(12.624)	(12.805)	(13.510)	(16.484)	(14.725)
Selfemployed	0.065	0.349	0.220	0.047	0.211	0.100
	(0.246)	(0.477)	(0.414)	(0.211)	(0.408)	(0.300)
Not in labor force	0.096	0.127	0.129	0.511	0.448	0.367
	(0.294)	(0.333)	(0.335)	(0.500)	(0.497)	(0.482)
Unemployed	0.050	0.026	0.046	0.053	0.044	0.059
	(0.219)	(0.160)	(0.210)	(0.225)	(0.205)	(0.236)
Part-time work	0.039	0.041	0.041	0.204	0.188	0.160
	(0.194)	(0.197)	(0.197)	(0.403)	(0.390)	(0.367)
Full-time work	0.815	0.806	0.784	0.231	0.320	0.414
	(0.388)	(0.395)	(0.411)	(0.422)	(0.466)	(0.493)
No qualification	0.088	0.214	0.404	0.091	0.280	0.440
	(0.283)	(0.410)	(0.491)	(0.287)	(0.449)	(0.496)
University qualification	0.191	0.067	0.064	0.120	0.037	0.039
	(0.393)	(0.250)	(0.244)	(0.325)	(0.188)	(0.194)
Years of schooling	11.423	10.486	9.324	10.954	9.693	8.901
	(2.688)	(2.736)	(3.068)	(2.405)	(2.624)	(2.845)
Logarithmic income	7.677	9.718	9.552	6.909	8.676	8.747
	(0.372)	(0.720)	(0.879)	(0.680)	(1.129)	(1.109)
Married	0.831	0.807	0.572	0.806	0.804	0.608
	(0.375)	(0.394)	(0.495)	(0.396)	(0.397)	(0.488)
Professional	0.284	0.232	0.186	0.318	0.214	0.198
	(0.451)	(0.422)	(0.389)	(0.466)	(0.410)	(0.398)
Service worker	0.289	0.206	0.227	0.600	0.542	0.600
	(0.453)	(0.404)	(0.419)	(0.490)	(0.498)	(0.490)
Agricultural worker	0.031	0.139	0.144	0.012	0.122	0.082
	(0.174)	(0.346)	(0.351)	(0.109)	(0.328)	(0.274)
Blue Collar worker	0.396	0.423	0.443	0.070	0.122	0.120
	(0.489)	(0.494)	(0.497)	(0.256)	(0.327)	(0.325)
Number of observations	2027	11677	43795	2067	8519	43745

Table gives the sample means; standard deviations in parentheses.
Sources: New Zealand Census 1986 (see Winkelmann and Winkelmann 1998); OSA 1986 (available from OSA, Tilburg University).

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